New claims

1. A method for automated detection and checking of geometrical and/or textural features of an object (1) in various views, in particular in side views (1b) and a plan view (1a), using an opto-electronic image-recording device (2) as well as a storage and evaluation unit (7) for image processing and image evaluation, wherein quality or state assessment of the object is effected by a comparison with parameters which are predetermined in respect of the individual features, wherein a plurality of partial images (11a through 11e) of the object are substantially simultaneously recorded by means of a number of image-recording devices and beam-deflection means (5), which number is smaller than the plurality of partial images, and at least partially optically assembled at the same time to form an overall image (11) which shows all views and in which the boundaries of the partial images can be recognised, and the overall image is evaluated separately for checking the individual features in the boundaries of the partial images, characterised in that

- in the regions (11b through 11e) of the overall image, which show side views (1b) on to the object (1), locations at which the object comes very close to a support surface (4) are ascertained by analysis of the gray value distributions,

- subsequently the light quantity which passes through between the object and the support surface and which is reflected in the pixels as an intensity value is detected,

- the local light quantity pattern characterising the width of a gap between the object and the support surface is determined using the intensity values, and

- the light quantity pattern is converted in accordance with a predetermined algorithm using calibration information into a gap width which is present between the object and the support surface.

2. A method as set forth in claim 1 characterised in that all partial images (11a through 11e) are assembled optically and recorded by precisely one image-recording device (2).

3. A method as set forth in claim 1 or claim 2 characterised in that in the overall image (11) the regions of the partial images are so positioned and identified, using the storage and evaluation unit (7), that they can be associated with the individual views (1a, 1b).

claim 1

4. A method as set forth in ~~one of the preceding claims~~ claim 1 characterised in that in at least one additional step the scene is recorded without object (1) and/or with a reference object which has predetermined parameters in respect of the features and the corresponding overall image (11) is put in the storage and evaluation unit (7) for comparison and calibration purposes.

claim 1

5. A method as set forth in ~~one of the preceding claims~~ claim 1 characterised in that in a region (11a) of the overall image which shows in particular a plan view (1a), by means of image processing, using convolution filters, areas with severe local intensity differences are emphasised, detected and quantified in respect of their dimensions.

claim 1

6. A method as set forth in ~~one of the preceding claims~~ claim 1 characterised in that integrated into the overall image (11) is a representation of the side of the object (1) which is remote from the or all image-recording device or devices (2) and which is in particular towards the support surface (4).

7. An apparatus for automated detection and checking of geometrical and/or textural features of an object (1) in various views (1a, 1b), in

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particular in side views and a plan view, comprising an opto-electronic image-recording device (2) and a storage and evaluation unit (7) for image processing and image evaluation, wherein there are provided optical means (5) for beam deflection, by means of which a plurality of partial images (11a through 11e) of the object are substantially simultaneously recorded by a number of image-recording devices, which number is smaller than the plurality of partial images, and are at least partially assembled optically at the same time to form an overall image (11) which shows all views and in which the boundaries of the partial images are recognisable, characterised in that there is provided a flat support surface (4) for the object and the beam-deflection means (5) are arranged substantially in the plane of the support surface in such a way that there is a view parallel to the support surface, which permits checking of the coplanarity of a plurality of parts (1.1) of the object, which are towards the support surface.

8. An apparatus as set forth in claim 7 characterised in that there is provided a single image-recording device (2), relative to which the object (1) is positioned in such a way that it fills only a partial region of its field of view which is determined by the viewing angle (3), and that disposed in remaining parts of the field of view are beam-deflection devices (5) which project side views (1b) of the object on to the image-recording device.

9. An apparatus as set forth in claim 7 or claim 8 characterised in that the beam-deflection means have prisms (5) or mirrors which in particular are displaceable and/or have curved surfaces.

10. An apparatus as set forth in claim 7 or claim 8 characterised in that the beam-deflection beams have a light guide device.

11. An apparatus as set forth in *claim 7* ~~one of claims 7 through 10~~ characterised in that associated with at least one of the beam-deflection means are means (6) for changing the imaging scale of at least one partial

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image with respect to at least one other partial image, in particular a lens arrangement.

12. An apparatus as set forth in ~~one of claims 7 through 11~~ claim 7 characterised by a lighting device (8a, 8b, 9) which in particular has a light diffuser device (9) for producing a uniform light flux under the object (1), which is arranged behind projecting parts (1.1) of the object.

13. An apparatus as set forth in claim 12 characterised in that the light diffuser device (9) is interrupted in such a way as to permit a view on to the side of the object (1), which is remote from the or all image-recording device or devices (2).

14. An apparatus as set forth in ~~one of claims 7 through 13~~ claim 7 characterised in that the image-recording device (2) and the storage and evaluation unit (7) are integrated to form a structural unit.

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